REMARKS

Prior to entry of this paper, claims 1-17, 19, and 21-25 were pending. In this paper, Claims 1-17, 19, and 21-25 are cancelled and new Claims 26-51 are added. Claims 26-51 are currently pending. In the amendment filed by Applicant on August 4, 2005, in response to the final Office Action, several amendments were made, even though it was and is believed that the claims were in condition for allowance without amendment. These amendments were only made due to the fact that several claims stood finally rejected. In light of the fact that the finality of the Office Action has been removed, in this paper, Applicant restores the claims to the state their were in after the entry of the amendment filed by Applicant on March 29, 2005, but before entry of the amendment filed on August 4, 2005. Accordingly, Claims 1-25 have been canceled and re-written as Claims 26-50 respectively. For Claims 26-50, the correspondence between the current claims and the earlier claims numbers may be obtained by simply subtracting 25 from the current claim number. No new matter is added by way of this amendment. For at least the following reasons, Applicant respectfully submits that each of the presently pending claims is in condition for allowance.

Allowable Subject Matter (Claims 35-38)

Claims 35-38 are the re-numbered versions of Claims 10-13, which were identified as containing allowable subject matter, but were objected to as being dependent on a rejected base claim. It is respectfully submitted that each of the independent claims are allowable for at least the reasons stated below. Accordingly, Applicant respectfully submits that Claims 35-38 are in condition for allowance.

Claims 26-28, 30, 45, 47, 48, and 51

In the final Office Action dated June 21, 2005, Claims 1-3, 5, 20, and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Myers (U.S. Patent No. 5,184,127) in view of Wang et al. (U.S. Patent No. US 6,535,156). Since Claims 26-28, 30, 45, and 47 are the re-numbered

versions of Claims 1-3, 5, 20, and 22 respectively as those Claims were written at that time, it is presumed that the same rejection stands.

Further, in the final Office Action dated June 21, 2005, Claim 23 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Myers modify by Wang et al. as applied to claim 1, in further view of Tyrrel (U.S. Patent No. 4,137,525). Since Claim 48 is the re-numbered version of Claim 23 as it was written at that time, it is presumed that the same rejection stands.

The rejections to Claims 26-28, 30, 45, 47, 48, and 51 are respectfully traversed.

It is respectfully submitted that the rejection is improper at least because a prima facie of obviousness has not been established. It is respectfully submitted that there is no motivation to modify Myers in the manner proposed by the Office Action.

Myers describes a droop compensation circuit. In a calibration mode, a slope of a ramp signal is calibrated for droop compensation. During normal operation (steady state mode), sample-and-hold circuit 20 (of FIG. 1 of Myers) performs a sample-and-hold operation on the video input signal. The held video signal is summed with the calibrated ramp signal to compensate for droop in the held voltage. The droop-compensated voltage is converted into a digital signal by subranging analog-to-digital conversion. (See Col. 1, line 63 through Col. 3, line 67 of Myers).

During the calibration mode of Myers, first, normal sample-and-hold timing is employed. The calibration DAC 13 of Myers provides an output reference to the input of the sample-and-hold circuit 20, and the slope of ramp generator 19 is initialized at zero. Next, an extended hold time is employed. Error signal E is then provided as V1 (the output of the coarse quantizer Q1 during the normal sample-and-hold timing) minus V2 (the output of the coarse quantizer Q2 during the extended sample-and-hold timing). The error signal E represents the amount of change in the hold output that takes place over the time interval defined by the delay in the Q1 strobe relative to the normal Q1 strobe timing. (See Col. 4, lines 4-63 of Myers).

The input of droop compensation DAC 15 of Myers is adjusted to produce the ramp signal based on error signal E for canceling droop of the held voltage. Error signal E is iteratively re-calculated and the ramp signal changed based on the new value of the error signal E until the error signal E has been reduced to the resolution limit of the coarse quantizer Q1. The process is a coarse calibration of the ramp signal to compensate for droop. (See Col. 4 line 64 though Col. 5, line 9 of Myers). The calibration is calibration of the ramp signal for droop compensation; it is not calibration of the analog-to-digital conversion.

After the coarse calibration of the ramp signal is complete, the residue of the coarse quantization (modified by the ramp signal) is provided to the fine quantizer Q2 to perform fine calibration for the ramp signal. (See Col. 5, lines 10-22 of Myers). The determined coarse and fine calibration values are used during normal operation for providing the ramp signal while the video input signal is converted to a digital signal through subranging A/D conversion. (See Col. 2, lines 67 through Col. 3, line 67 of Myers).

The Office Action proposes incorporating the fine ADC 201 of Wang into the fine quantizer Q2 of Myers, to provider finer measurement resolution because each measurement resolution is resolved into n different levels. In this proposed modification, the residue of the coarse quantization, which is normally quantized by fine quantizer Q2 of Myers, would instead by quantized by fine ADC 201 of Wang. However, if Myers were modified by replacing fine quantizer Q2 of Myers with fine ADC 201 of Wang, the circuit would have no way to determine which folded region the residue is within. Fine ADC 201 in the proposed modification would determine which of n levels the residue was within, where each of N regions of measurement of the residue would be divided into n levels, but it would have no way to determine which of the N regions of measurement the residue is within.

Since the proposed modification would not determine which of the N regions of measurement the residue is within, but would instead only determine which of n levels within the unknown region of measurement the residue is within, the proposed modification would not give an

accurate result. Accordingly, there is no motivation to combine the references in the manner suggested by the Office Action.

Claims 27, 28, 30, 47, and 48 are respectfully submitted to be allowable at least because they depend on Claim 26, which is proposed to be allowable.

Further, Claim 47 is respectfully submitted to be allowable at least because neither Myers nor Wang, singly or in combination, teach or suggest "wherein the coarse channel calibration circuit is arranged to calibrate the coarse analog-to-digital conversion", as recited in Applicant's Claim 47. In Myers, the calibration is performed to calibrate the ramp signal which compensates for droop of the held signal. Calibration of the coarse channel itself is not performed in Myers.

Claims 45 and 51 are respectfully submitted to be allowable at least for reasons analogous to those stated with regard to Claim 26 above. Additionally, Claim 45 is respectfully submitted to be allowable at least because neither Myers nor Wang, singly or together, teach or suggest the limitation, "means for calibrating the coarse channel circuit", as recited in Applicant's Claim 45. In Myers, the calibration is performed to calibrate the ramp signal which compensates for droop of the held signal. Calibration of the coarse channel itself it not performed in Myers.

Claims 40 and 43

In the final Office Action dated June 21, 2005, Claims 15 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Myers (U.S. Patent No. 5,184,127) in view of Nix et al. (U.S. Patent No. US 6,677,879). Since Claims 40 and 43 are the re-numbered versions of Claims 15 and 18 respectively as those Claims were written at that time, it is presumed that the same rejection stands. The rejection is respectfully traversed.

It is respectfully submitted that the rejection to Claim 40 is improper at least because a prima facie of obviousness has not been established. First, it is respectfully submitted that there is no motivation to modify Myers in the manner proposed by the Office Action. Second, it is respectfully

submitted that the combination proposed by the Office Action would change the principle of operation of the circuit of Myers reference. Third, it is respectfully submitted that Myers and Nix, singly or in combination, do not teach or suggest all of the limitations of Claim 40.

Because the fine quantizer Q2 of Myers is quantizing the residue of the coarse conversion (as modified by the ramp signal), there is no reason to modify Myers to incorporate a folding architecture. In Myers, since fine quantization is performed on the residue of coarse quantization, the fine quantization is being performed on one coarse region only. Accordingly, there is no reason to fold N coarse regions together into one course region—the fine quantizer Q2 of Myers already has only one coarse region to deal with. Accordingly, there is no motivation to modify Myers in the manner suggested in the Office Action.

Further, it is respectfully submitted that the combination proposed by the Office Action would change the principle of operation of the circuit of the Myers reference. The circuit of Myers is designed for droop compensation for a subranging analog-to-digital converter. (See Col. 1, line 63 through Col. 2, line 2 of Myers). To design the circuit of Myers based on a folding ADC architecture would require a fundamental re-working of the architecture of the circuit of Myers that would change the basic principles under which the circuit of Myers was designed to operate.

Several different architectures for analog-to-digital conversion (ADC) are known in the art, including, inter alia, sub-ranging ADC and folding ADC. Sub-ranging ADC is also referred to as pipeline ADC. Sub-ranging ADC and folding ADC are two fundamentally different approaches to analog-to-digital conversion that require fundamentally different architectures.

The fundamental operating principle of Myers is that Myers is a subranging analog-to-digital converter. To change Myers so that it is a folding analog-to-digital converter rather than a subranging analog-to-digital converter would change the fundamental operating principle of Myers that Myers is a subranging analog-to-digital converter.

Moreover, it is unclear what incorporating "the folding analog-to-digital converter taught by Nix et al. into Myers's circuit" could possibly mean other than replacing the entire converter circuit 11 of Myers with the entire folded ADC 100 of Nix, at which point, rather than being a combination of Myers and Nix, only the circuit of Nix remains. But the circuit of Nix does not teach all of the limitations of the claims.

Additionally, it is respectfully submitted that Myers and Nix, singly or in combination, do not teach or suggest the limitation "a coarse channel calibration circuit that is configured to ... adjust **a parameter of the coarse channel circuit** in response to the output signal" (emphasis added), as recited in Applicant's Claim 40.

In Myers, compensation is performed to change a parameter of **ramp generator 19** so that the slope of the ramp signal is calibrated. A parameter of the course quantizer Q1 is not changed, because the circuit of Myers is directed towards calibrating the ramp signal, not the analog-to-digital conversion. In contrast, Applicant's Claim 40 recites "adjust a parameter of the coarse channel circuit".

For at least the reasons stated above, it is respectfully submitted that Claim 40 is allowable, and notice to that effect is earnestly solicited.

The rejection to Claim 43 is respectfully traversed at least for reasons analogous to those stated above for Claim 40.

Further, it is respectfully submitted that neither Myers nor Nix, singly or in combination, teach or suggest the limitation "adjusting a parameter of the coarse channel circuit until an output of the coarse channel circuit is calibrated in relation to the reference voltage". In Myers, the calibration is performed to calibrate the ramp signal, not quantizer circuit Q1.

For at least the reasons stated above, it is respectfully submitted that Claim 43 is allowable, and notice to that effect is earnestly solicited.

Claims 46 and 50

In the final Office Action dated June 21, 2005, Claims 21 and 25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang in view of Myers. Since Claims 46 and 50 are the re-numbered versions of Claims 21 and 25 respectively as written at that time, it is presumed that the same rejection stands. The rejection is respectfully traversed.

First, Claim 46 is respectfully submitted to be allowable at least because it depends on Claim 26, which is proposed to be allowable.

Second, Claim 46 is respectfully submitted to be allowable at least because a prima facie case of obviousness has not been made. There is no motivation to modify Wang in the manner suggested in the Office Action.

The Office Action dated June 21, 2005 stated that incorporating "the calibration circuit (11) taught by Myers in to Wang et al. for the purpose of providing fast, accurate conversion, low noise, and low distortion over the band width of interests", citing Col. 2, lines 11-17 of Myers. However, Wang is a folding ADC, and Myers is a subranging ADC. Because folding ADC and subranging ADC are fundamentally different, there is no reason to suppose that in advantages present for using a sub-component of one of the circuits would provide the same advantages if used in the other. The cited advantages of Myers occur due to the droop compensation. However, since the folding ADC 200 of FIG. 2 of Wang does not include a sample-and-hold circuit, there would be no droop to compensate for in the proposed combination. By adding a ramp signal that attempts to compensate for a droop that does not exist in the circuit, the proposed modification would only insert additional error into the circuit of Wang. Accordingly, there is no motivation to combine the references in the manner suggested by the Office Action.

Claims 29, 31, 32, 33, 39, 41, 42, 44, and 49

In the Office Action dated August 15, 2005, Claims 1-9, 14-17, 19, and 21-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Wang et al. in view of Lee et al. (U.S. Patent

No. 6,791,484, hereinafter Lee) and further in view of Chen et al. (U.S. Patent No. 6,628,216, hereinafter Chen). Accordingly, the same rejection presumably stands with regard to Claims 29, 32, 33, 34, 39, 41, 44, and 49 which are the re-written versions of Claims 4, 7, 8, 9, 14, 16, 19, and 24, respectively.

In the amendment filed on August 4, 2005, Claim 1 was re-written to include the limitations of Claim 6. Accordingly, the rejection to Claim 1 made in the Office Action of August 15, 2005, presumably stands with regard to Claim 31.

In the amendment filed on August 4, 2005, Claim 15 was re-written to include the limitations of Claim 17. Accordingly, the rejection to Claim 15 made in the Office Action of August 15, 2005, presumably stands with regard to Claim 42.

Claims 29, 31-33, 39, and 49 are respectfully submitted to be allowable at least because they depend on Claim 26, which is proposed to be allowable. Claims 41 and 42 are respectfully submitted to be allowable at least because they depend on Claim 40, which is proposed to be allowable. Claim 44 is respectfully submitted to be allowable at least because it depends on Claim 43, which is proposed to be allowable.

Additionally, Claims 29, 31-33, 39, and 49 are respectfully submitted to be allowable at least because neither Wang nor Lee nor Chen, singly or in combination, teach or suggest "a coarse channel circuit; and a coarse channel calibration circuit that is coupled to the coarse channel circuit", as recited in Applicant's Claim 26 from which Claims 29, 31-33, 39, and 49 depend.

The proposed combination of Wang, Lee, and Chen would presumably be structured as follows. The proposed modification would be the ADC system of 300 of FIG. 3 of Lee, but folding ADC 200 of FIG. 2 of Wang would be incorporated within overranging ADC 306 of FIG. 3 of Lee. Accordingly, the overranging ADC 306 of Lee in the proposed combination would include a fine channel (fine ADC 302 of FIG. 2 of Lee) and a coarse channel (coarse ADC 203 of FIG. 2 Wang). Also, the proposed combination would include coarse offset calibration circuit 304 of Lee. Additionally, a resistor ladder within the proposed combined circuit would be calibrated with the circuitry illustrated in FIG. 8 of Chen in the proposed combination.

However, in this proposed combination, coarse offset calibration circuit 304 of Lee is not a "coarse channel calibration circuit." Because "coarse channel" has antecedent basis in the claim, a

circuit can only be a "coarse channel calibration circuit" as recited if it calibrates the cited "coarse channel". In the proposed combination, coarse offset calibration circuit 304 (of FIG. 3 of Lee) does not calibrate the coarse channel (coarse ADC 203 of FIG. 2 of Wang). Rather, coarse offset calibration circuit 304 (of FIG. 3 of Lee) provides coarse offset calibration for the analog input signal of the ADC.

Also, in the proposed combination, there would be coarse offset calibration circuit 304 (of FIG. 3 of LEE) to provide coarse offset calibration for the overranging ADC, and there would be a calibration circuit (for a resistor ladder) provided by the circuitry of FIG. 8 of Chen. These would be separate circuits. Therefore, the coarse offset calibration circuit 304 of Lee would not include a counter circuit, because the counter circuit would be included in a completely different circuit. Nor does the coarse offset calibration circuit 304 of Lee include an amplifier array. If the Office Action is proposing that the circuitry of FIG. 8 of Chen would be used to replace the coarse offset calibration circuit 304 (of FIG. 3 of Lee), this would not operate correctly, because these two circuits have completely different functions.

Claims 41 and 42 are also respectfully submitted to be allowable at least for reasons analogous to those stated above with regard to Claims 29, 31-33, 39, and 49. Claim 40, from which Claims 41 and 42 depend, specifically recites, "a coarse channel circuit of a folding analog-to-digital converter". Coarse offset calibration circuit 304 in the proposed combination does not calibrate the coarse channel (coarse ADC 203 of FIG. 2 of Wang) of the proposed combination.

Claim 34 is also respectfully submitted to be allowable at least because neither Wang nor Lee nor Chen, singly or in combination, teach the limitation, "the parameter comprises one of a single-ended current or differential current" in combination with the limitation, "adjust a parameter of the coarse channel circuit in response to the count signal". Claim 34 is the re-numbered version of Claim 9. With regard to Claim 9, the Office Action states that Chen "further discloses wherein the parameter comprises one single-ended current or differential current (Chen et al., Col. 26 lines 10-13)". However, Col. 26, lines 10-13, of Chen states, "the resistance of and current through the resistor tree of the calibration resistors remains the same before and after each adjustment by the control logic". Accordingly, the current through the resistor tree is not adjusted in response to the count signal.

Claim 41 is also respectfully submitted to be allowable at least because neither Wang nor Lee nor Chen, singly or in combination, teaches or suggest "assert a timing signal for latching the coarse channel calibration circuit at a pre-determined amount of time after a change of the select signal", as recited in Applicant's Claim 41. Claim 41 is the re-numbered version of Claim 16. With regard to Claim 16, the Office Action states, "Chen at al. further disclose a control circuit (807) provide a selecting signal (output of 807) for selecting a reference voltage (139) and assert a timing signal (CLK) for latching a circuit at a predetermined amount of time after a change of the selection signal (output of 807)." It is respectfully submitted that control circuit 807 does not assert CLK; rather, CLK is an input of control logic 807. Further, CLK is a clock signal that is not influenced by whether the output of 807 changes. Claim 41 requires that the control circuit provide a timing signal such that the timing signal is influenced by whether the selection signal changes; more specifically, if the selection signal changes, the timing signal is asserted by the control signal at a pre-determined amount of time after the change in the selection signal. However, control logic 807 has no control over signal CLK, nor is signal CLK adjusted based on whether or not the output of control logic 807 is changed. Accordingly, all of the limitations of Claim 41 are not taught by the references. Claim 39 is respectfully submitted to be allowable at least for similar reasons.

CONCLUSION

It is respectfully submitted that each of the presently pending claims (Claims 26-51) are in condition for allowance and notification to that effect is requested. Examiner is invited to contact the Applicants' representative at the below-listed telephone number if it is believed that the prosecution of this application may be assisted thereby. Although only certain arguments regarding patentability are set forth herein, there may be other arguments and reasons why the claimed invention is patentable. Applicant reserves the right to raise these arguments in the future.

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Respectfully submitted,

By _____

Matthew M. Gaffney
Registration No.: 46,717
DARBY & DARBY P.C.
P.O. Box 5257
New York, New York 10150-5257
(206) 262-8900
(212) 527-7701 (Fax)
Attorneys/Agents For Applicant